Use of SWOT ocean data in Mercator-Ocean Operational Oceanography processing chains. Methods, Studies and Impact

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  - Mercator Océan is the french operational oceanography center in charge of global ocean forecast.
- The question :
  - How SWOT high resolution observations can impact ocean analysis and forecast?
  - What kind of forecats :

    Global ocean, with some focus areas in the North East Atlantic or in the Mediterranean Sea

    Model resolution between 3 and 10 km.

    Short and medium range forecasts, from few hours to 2 weeks.

    For physics and biogeochemistry
- Focus will be done on :
  - Ocean meso scale structures from 10 to 100km, the dynamic of the surface layer in the eddies, along the front.
  - Consistency between the dynamic observed with SWOT high resolution observation, the other satellite observations and the thermohaline properties of the water masses constrained with argo network.
  - Validation of the tide in global ocean model.

Objectives and approach

- **Ocean models and data assimilation technics**
  - **NEMO** ocean model with **global** and/or **basin scale** configurations at 1/12° and 1/36° of horizontal resolution.
  - SAM **assimilation scheme** based on SEEK filter. Adaptation of the assimilation scheme to assimilate a bigger amount of observations, higher resolution signal.

- **OSSE experiments based on identical and fraternal twin experiments.**
  - **Simulation of the observations** with global 1/12° model and/or in the North East Atlantic at 1/36°, or other simulated observations if available
  - **Assimilation** of the simulated observations in 1/12° configuration
  - Adaptation of the assimilation scheme to constrain the model at the good time and space scale. Which resolution for the analysis? What kind of assimilation windows to constrain the meso scale with the resolution and repetivity of SWOT?
  - Main effort to be done on the **model and observation errors**. Diagnostics based on Desrozier criteria and/or DFS to specified and tuned the observation errors

SWOT issues

- **Oceanographic issues**
  - Impact of **repetitivity** in the analysis and in the forecast skill, especially for the meso scale structures
  - Where **high resolution** of the observation are usefull for global ocean analysis and forecast? Quantification will be done thank to OSSE experiments.
  - **Consistency** between high resolution information from SWOT and other ocean observation as insitu, SST or conventionnal altimetry observations